Group of Governmental Experts of the High Contracting Parties to the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects

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Examination of various dimensions of emerging technologies in the area of lethal autonomous weapons systems, in the context of the objectives and purposes of the Convention

Characteristics of Lethal Autonomous Weapons Systems

Submitted by the United States of America

I. Introduction

1. This working paper seeks to contribute to the meetings of the Group of Governmental Experts (GGE) on Lethal Autonomous Weapons Systems (LAWS) in Geneva between November 13–17, 2017, by providing the views of the United States on: (i) identifying characteristics of "LAWS" rather than negotiating a "definition" in these GGE discussion; (ii) recommendations regarding characteristics of LAWS; and (iii) definitions used by the United States Department of Defense in internal policies on the use of autonomy in weapon systems.

II. Identifying characteristics of LAWS rather than negotiating a definition of "LAWS" in these GGE discussions

2. The United States believes that it is unnecessary for the GGE to adopt a specific working definition of LAWS. Instead, we support promoting a general understanding of the characteristics of LAWS. We believe that the absence of a specific working definition is no impediment to the GGE's work in understanding the potential issues posed by LAWS. Given that the law of war provides a robust and coherent system of regulation for the use of weapons, the GGE can discuss the issues potentially posed by "LAWS" under the object and purpose of the CCW without needing to agree on a specific working definition of LAWS. For example, as explained in the United States working paper on legal issues, the law of war's existing rules of general applicability apply with respect to the use of all weapons, including any weapons deemed to be "LAWS."

3. A legal definition is generally developed for the specific purposes of a legal rule and not in the abstract. Often legal definitions determine the scope of a legal rule, *i.e.*, the matters to which the rule would apply. For example, the definition of "remotely-delivered mine" in the CCW Amended Protocol II identifies what types of mines are subject to a set of restrictions in that Protocol.

4. A working definition should not be drafted with a view toward describing weapons that should be banned. This would be premature and counterproductive because it would divert time and effort from understanding the issues to negotiating what would be covered.

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As the High Contracting Parties have not decided to negotiate or adopt a new protocol specifically to ban or regulate LAWS, any common understanding of LAWS must not prejudice future decisions regarding potential outcomes.

5. In identifying characteristics of LAWS, we must be cautious not to make hasty judgments about the value or likely effects of emerging or future technologies. Frequently, we may change our views of technologies over time as we gain more experience with them. In particular, we want to encourage innovation and progress in addressing the objects and purposes of the Convention.

III. Recommendations regarding characteristics of LAWS

6. Although we believe it unnecessary for the GGE to seek to negotiate a single working definition, we support identifying general characteristics of LAWS in order to promote our understanding of the relevant concepts or issues in these GGE discussions. Identifying general characteristics of LAWS will help us understand what is generally referred to by this term, without providing a definition that would establish the parameters or what is, or is not, included. This flexibility in approach is important given that scientists and engineers continue to develop new technological advancements and that our understanding continues to improve. In light of that purpose, we offer the following recommendations regarding characteristics of LAWS.

7. The characteristics of LAWS should be intelligible to all relevant audiences, including roboticists, engineers, scientists, lawyers, military personnel, and ethicists. The characteristics of LAWS should not be identified based on specific technological assumptions such that the characteristic would be rendered obsolete by technological developments. In this regard, we should not articulate specific levels of autonomy or types of machine reasoning. Our sense is that creating technical categories like this or seeking to define "artificial intelligence" would be especially ill-advised because there are already diverse taxonomies along these lines and because scientists and engineers continue to develop technological advancements.

8. Seeking to define the sophistication of the machine intelligence would incorrectly focus on the machine, rather than understanding what is important for the law — how human beings are using the weapon and what they expect it to do. For example, it is irrelevant under the law of war whether a rocket engine is powered by a solid fuel or a liquid propellant. Rather, the law of war is concerned with how that power is used in combat. Similarly, focusing on the sophistication of the "analytical engine" powering a weapon (e.g., what type of algorithm or method of machine learning is employed) risks ignoring the focus of the law — how humans will use that weapon (e.g., using the machine to select and engage targets without further intervention by a human operator).

9. Lastly, focusing on the machine also could stimulate unwarranted fears that are more the product of science fiction and popular imagination than fact.

IV. Definitions used by the United States Department of Defense in internal policies on the use of autonomy in weapon systems

10. In light of the above considerations and to further the GGE's understanding of some of the relevant concepts and issues related to the characteristics of LAWS, we offer for consideration definitions that the Department of Defense has specifically developed for use in its internal policies relating to the use of autonomy in weapon systems.

11. Although the GGE's purpose may be different than the purposes for which these definitions were created, we believe these definitions help demonstrate the careful thought that should be applied when identifying the relevant characteristics of LAWS. For example, these definitions were developed after considering existing weapon systems. These definitions do not depend on a technical characterization of the sophistication of the machine reasoning. Instead, these definitions focus on what we believe to be the most

important issues posed by the use of autonomy in weapon systems — people who employ these weapons can rely on the weapon systems to select and engage targets.

12. Department of Defense policy includes the following definitions:

(a) "**autonomous weapon system**. A weapon system that, once activated, can select and engage targets without further intervention by a human operator. This includes human-supervised autonomous weapon systems that are designed to allow human operators to override operation of the weapon system, but can select and engage targets without further human input after activation."

(b) "**semi-autonomous weapon system.** A weapon system that, once activated, is intended to only engage individual targets or specific target groups that have been selected by a human operator. This includes:

> Semi-autonomous weapon systems that employ autonomy for engagement-related functions including, but not limited to, acquiring, tracking, and identifying potential targets; cueing potential targets to human operators; prioritizing selected targets; timing of when to fire; or providing terminal guidance to home in on selected targets, provided that human control is retained over the decision to select individual targets and specific target groups for engagement.
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> 'Fire and forget' or lock-on-after-launch homing munitions that rely on TTPs [tactics, techniques, and procedures] to maximize the probability that the only targets within the seeker's acquisition basket when the seeker activates are those individual targets or specific target groups that have been selected by a human operator."

13. The United States Department of Defense Directive establishing these definitions "[d]oes not apply to autonomous or semi-autonomous cyberspace systems for cyberspace operations; unarmed, unmanned platforms; unguided munitions; munitions manually guided by the operator (e.g., laser- or wire-guided munitions); mines; or unexploded explosive ordnance." Therefore, these types of systems, platforms, weapons, or devices, would not be considered to fall within the rules established by this Department of Defense Directive for "autonomous" or "semi-autonomous" weapons.